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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,931	07/21/2006	Dong-Hyun Ryu	4220-130 US	8187
26817 7590 05/13/2009 MATHEWS, SHEPHERD, MCKAY, & BRUNEAU, P.A. 29 THANET ROAD, SUITE 201 PRINCETON, NJ 08540				
EXAMINER				
BARROW, AMANDA J				
ART UNIT		PAPER NUMBER		
1795				
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05/13/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/586,931

**Applicant(s)**

RYU ET AL.

**Examiner**

AMANDA BARROW

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 July 2006.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-5 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 21 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO/CIS)  
Paper No(s)/Mail Date 4/27/07  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al. (US Patent Application 2001/0033971 A1) (hereinafter "Zhao") in view of Kamino et al. (US Patent 6,132,904) (hereinafter "Kamino").

Regarding claim 1, Zhao teaches a solid polycarbon sulfide to be used as an active material for a positive electrode in a battery. Zhao teaches that it is well known in the art to provide a positive electrode containing carbon and sulfur (see examples given in paragraphs 4-8). Zhao teaches that the polycarbon sulfide contains at least 67 wt. % sulfur and at least 95 wt. % of carbon and sulfur in total (paragraphs 11-15).

These weight percentage values taught by Zhao fall within the range claimed. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie

case of obviousness exists. *In re Wertheim*, 541 F.2d.257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990); *In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed Cir. 1997). See MPEP 2144.05.

Zhao teaches that the active material of the negative electrode can be alkali metals such as sodium. Zhao teaches that the negative electrode is constructed by pressing the metal or the alloy to a current-collecting material giving evidence that the sodium used is solid (paragraph 60). Zhao teaches that the nonaqueous electrolyte or electrolytic solution is prepared by dissolving an electrolyte salt in a nonaqueous solvent component (paragraph 62). Zhao gives examples of the possible solvent component listing ethylene carbonate and propylene carbonate among others (paragraph 63). Zhao gives examples of the electrolyte salt to be used listing halides or perchlorates of sodium among others (paragraph 66).

Zhao does not list how many moles of sodium salt should be dissolved in the solvent; however, it would be obvious to a person of ordinary skill in the art to find the optimum value of salt to be added to the solvent to provide an electrolytic solution. The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.).

Zhao does not teach that the positive electrode contains 0.001-50 wt. % polyethylene oxide; however, Zhao states that the positive electrode contains at least 95 wt. % of carbon and sulfur in total (paragraphs 11-15), therefore leaving room for an additional component. Kamino teaches the use of polyethylene oxide in positive electrodes for the purpose of increasing the mechanical strength of the electrodes (column 1, lines 39-52). It would be obvious to a person of

ordinary skill in the art to adapt the use of polyethylene oxide in positive electrodes to the battery system of Zhao for the purpose of increasing the mechanical strength of the electrode (Kamino, column 1, lines 39-52).

Regarding claim 2, Zhao teaches that the sodium of the negative electrode can be sodium metal (paragraph 59).

Regarding claim 3, Zhao teaches that the sulfur used for the positive electrode begins as an alkali metal sulfide and sulfur (paragraph 30) and then is formed into polycarbon sulfide (abstract) which is an organic sulfur compound.

Regarding claim 4, Zhao teaches that preferable examples of the electrolyte salt to be dissolved in the solvent component include salts of fluorine-containing compounds such as trifluormethane sulfonate (paragraph 66). As sodium trifluorometasulfonate falls in the category of salts of fluorine-containing compounds, the prior art reads on the claim.

Regarding claim 5, Zhao teaches that the solvent for the electrolytic solution can be ethylene carbonate and propylene carbonate among others, noting that it is particularly preferable to use esters having a high dielectric constant (paragraph 63).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 7:30am-5pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sines can be reached on 571-272-1263. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AMANDA BARROW/  
Examiner, Art Unit 1795

/Brian J. Sines/  
Supervisory Patent Examiner, Art Unit 1795